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International edition

The independent Dragon magazine

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How to submit articles
The quality of the material we can publish in *Dragon User* each month will, to a very great extent depend on the quality of the discoveries that you can make with your Dragon. The Dragon computer was launched on to the market with a powerful version of Basic, but with very poor documentation.

Articles which are submitted to *Dragon User* for publication should not be more than 3000 words long. All submissions should be typed. Please leave wide margins and a double space between each line. Programs should, whenever possible, be computer printed on plain white paper and be accompanied by a tape of the program.

We cannot guarantee to return every submitted article or program, so please keep a copy. If you want to have your program returned you must include a stamped, addressed envelope.

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This month, you can win one of fifteen copies of Sprint Basic Compiler, donated by Oasis Software — if you can solve tricky Gordon Lee's latest mathematical mind boggler.

Editorial

EUROHARD, the Spanish company which bought the rights to manufacture the Dragon, has appointed North London-based Compusense as the UK distributors for the new, Spanish-built Dragons.

Eduargo Merigo, President of Eurohard SA, has gone on record as saying that he sees the future role of the Dragon as primarily an educational and small-business machine.

Ted Oprychal of Compusense endorses that view. He said that his company will not be importing the Dragon 32, and instead will be pushing the Dragon 64 with disk drives as an entry level business machine. His view is that the Dragon is dead as a games machine.

Compusense is lobbying Eurohard for the development of a new generation of Dragon micros and peripherals, biased towards the business and home applications market.

Eurohard's plans for the future include a 128K machine, networking, and hard disks, all of which seem aimed more at the serious rather than the games side.

On the other hand, while software for the Dragon has been harder to find in the shops in the last six months, there are plenty of games on the mail-order market, as a browse through the advertisements in *Dragon User* will show.

Some companies have moved into the Dragon market after Dragon Data got into trouble — Incentive, for example, did well with *Backtrack*, and has just converted its best-selling adventure, the *Ket Trilogy*.

Eurohard and Compusense may be right. Perhaps the future for Dragon does lie with the small business market. But on the other hand, there do seem to be large numbers of existing Dragon owners who want games. Eurohard should be careful about being over-zealous in the attempt to move the Dragon up-market. A substantial potential customer base could quite easily be alienated by bald statements concerning the death of the Dragon games market.

Letters

This is the chance to air your views — send your tips, compliments and complaints to Letters Page, *Dragon User*, 12-13 Little Newport Street, London WC2H 7PP.

On your uppers

IN REPLY to Mr Harrington's request for an alternative method for switching between upper-case and lower-case letters, the answer is quite simple. "SHIFT+0" (not "SHIFT+@") alters the alpha lock flag at address $149 which normally contains the default setting $FF for upper-case letters. To enter lower case from a program, all you need to do is clear the flag using either: CLR $149 in assembly language or POKE&H149,0 in BASIC. I suggest that you enter lower-case mode at the beginning of the program and then use the SHIFT key for upper-case letters.

I K Barker
32 Meadow Drive
Wheatley
Halifax
West Yorkshire HX3 5JZ

How to boot the Exec

THE FOLLOWING may be of interest to DRAGON USER readers who own Dragon 64s:

Although it is easy to "Boot" from 32K mode to 64K mode, by entering "EXEC", it seems no provision is made to reverse back to 32K mode again. This is probably no real problem but it does mean that disk drive owners cannot make use of the extra memory and save their programs to disk, they either use a tape or do their programming in 32K mode. The following routine may therefore be useful as it allows a "Reverse Boot" to be made, ie from 64 to 32 mode, without loss of the basic program in memory.

Obviously the size of the program must not be larger than the memory available in 32K mode but large basic programs that contain a "PCLEAR8" or large arrays, which would normally give an "OM" error in 32K mode, can now be loaded, "Booted" into 64K mode, run (and edited if necessary) then transferred back to 32K mode for saving to disk.

First a short m/code routine must be saved on a disk (or tape) and kept for whenever the "Reverse Boot" is needed. This can be done using the following basic program:

```
10 FOR I = &H7000 TO
   &H700E
20 READ A$
30 POKE I,VAL("&H"+A$)
40 NEXT
50 DATA 9E,19,BD,83,F3,30,
   2,9F
60 DATA 1B,9F,1D,9F,1F,39,
   0
```

After entering, type "RUN" then save the resulting m/code to disk using:

```
SAVE'REVERSE.BIN',
&H7000,&H700E,&H7000
```

To go to 32 mode from 64 simply type 'POKE 115,0' and press reset (this will produce the familiar DRAGON copyright screen) then, with the disk containing "REVERSE.BIN" in the drive, type 'RUN "REVERSE.BIN"' and the original basic program that existed in 64K mode will be restored.

D R Quinnell
10 Fountain Road
Strood
Rochester
Kent ME2 3SJ

Dragonquest query

I RECENTLY acquired a Dragon 64, in fact we received three of them.

Our problem is that none of us can solve the Dragon Game that came with it. We have had quite a number of people try the game but none of us can quite solve it.

If you could possibly give us some clue (please don't say "try examining things") it would be greatly appreciated.

The game is called *Dragonquest* and if anyone has any ideas on how to find the alchemist, the hut, the ruby or the shield or where to use the shovel, we would really like to know.

Still Trying,

Barbara Seay
6920 Woodman Ave
Van Nuys Ca 91405
USA

Dump to printer

I READ with interest Alan Wrigley's article in the February issue of *Dragon User* about dumping the high resolution screen on an Epson printer.

I have a "KDC FT-5001" printer that is very similar to the Epson, so I entered the program, only to find that it would not work.

Upon closer inspection, I found this was due to the program using the ESC "*" instruction which my printer does not use.

I then set about modifying the program so that it would work with my printer, and I thought other readers with similar printers may be interested in these modifications.

Add the following six bytes at the beginning of the program, starting at location 7E55:

```
B7,7F,F4,80,4B,39
```

Change these locations to:

```
7F1E : 8B
7F1F : 1A
7F20 : BD
7F21 : 7E
7F22 : 55
7F32 : EF
7F3A : F3
7F41 : F3
7FF2 : 00
7FF3 : 1B
```

The program now starts at location 32341 (7E55 hex) so when CLEARING space for it, the message is now:

```
CLEAR 200,32340
```

When saving the program, the message is now:

```
CSAVEM "PROGNAME",
32341, 32767, 32347
```

The routine is called in the same way as before, ie:

```
PMODE4,1:SCREEN,0:
EXEC32347
```

John Wardle
27 Magpie Way
Winslow
Bucks MK18 3JT

Flights of fancy?

BRIAN CADGE's flight simulator review omitted two minus points on the 747 simulator.

As the flight progresses, the computer memory is gradually used up until the game crashes with an OM ERROR, or at least mine does. On take off PRINT MEM = around 4000, and after a long flight PRINT MEM = around 100 to 200, hence the error message. The flight can be continued, losing no information, with a GOTO, when PRINT MEM = 4000 again, but this is not what should occur in a £9.95 game.

Secondly, you can presumably fly forever, as no fuel gauge is included. But, being Basic, it is not too difficult to add the gauge to the engines on/off and throttle control program lines. I've done this, and labelled the larger dials with their initials, which does improve the screen display somewhat.

Now, help required. Does anyone know the memory locations concerning the number of lives in Cable Software's 35 screen *Fantasy Flight*? I can't get beyond the first five or six screens with the five lives given. Otherwise it's an excellent game. Also I have a string of questions concerning *The Ring of Darkness*, so if anyone who has become fairly expert at this would care to contact me, postage would be returned along with my thanks and a list of queries.

M R Vine
120 Auriel Avenue
Dagenham
Essex RM10 8BU

Software Top 10

1	(1)	**Manic Miner**	S/Projects
2	(2)	**Hunchback**	Ocean
3	(3)	**Chuckie Egg**	A & F
4	(4)	**Dragon Chess**	Oasis
5	(–)	**Bug Diver**	M. Tronic
	(–)	**Chess**	Dragon Data
7	(–)	**Stock Control**	MST
	(–)	**Mailer/Address Book**	MST
9	(–)	**Business Accounts**	MST
	(–)	**Database**	MST

Chart compiled by Websters Software

If you're into program writing....

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I want to wish your company the very best with this cassette, it deserves to be a No. 1 seller.

Yours sincerely
Mr C Davis
W. Midlands

INTERPLANETARY TRADER

Pirate Attack! Just one of the many hazards encountered as you strive to become first ever GALACTIC MEGABILLIONAIRE! Success depends on ability to make lightning decisions, accurate forward planning. Should you brave the Meteor Storm to save precious time? Pay the outrageous protection demanded by Space Pirates? This massive 28K game provides compelling entertainment.

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Are you cool, level headed? You need nerves of steel to play EXECUTION. Standing before the awesome firing squad you realise this is your last chance to receive a pardon, but time is fast running out...Features full high res moving graphics and sound. Hours of fun guaranteed in this massive 30K game.

WUMPUS MANSION

Only a crazy person would go near WUMPUS MANSION. You however, have ventured INSIDE it!!! Tempted by hoards of priceless treasures your mission is to raid the mansion and leave through the maze of tunnels. Will you outwit the dreaded WUMPI?? Can you avoid the time bombs?? Incredible fun!! Uses 29K.

WIPEOUT

SCORE 5 HS 200

BE WARNED - THIS IS NOT EASY!!
A challenging multilevel graphic game demanding fast, accurate reaction. It begins easily enough, but gets progressively more difficult. Features 4 colour high resolution graphics, sound, bonus points and high score.

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Is it skill or luck? Can you turn your humble £50 stake into £1,000,000?? This simple yet highly compelling game supported by excellent colour graphics and brilliant sound effects. Over 20K of clever programming!

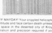
SNAIL PACE

The excitement is almost unbearable as you watch 1-8 'thoroughbred' racing snails' thrash it out on the racecourse!! Game features sensible odds and form guide to assist you. This superb piece of complex programming supported by magnificent graphics will ensure hours of excitement. A massive 26K!!

ATOM HUNT

A superb feat of programming to make your brain ache and stretch your Dragon's memory chips to the absolute limit!! This game is played almost entirely in the 4 colour graphic modes and features a unique repeat game facility, individual ratings, and 1-4 players. Uses over 20K!!

AIR ASSAULT



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Eurohard — plans for the Dragon

THE DRAGON 32 is dead in the UK, but not in Europe.

That is the message from Eurohard, the Spanish company which bought the rights to manufacture the Dragon, and Compusense, the North London company appointed to distribute Spanish Dragons in the UK.

According to Juan Carlos Montero, Eurohard's Head of PR and International Relations, the 32 will be made in Spain, unchanged from the original Welsh machine.

But Ted Oprychal of Compusense confirmed that the 32 will not be imported into Britain. "The Dragon 32 is still being sold in Spain, but it is not their preferred machine," he said.

Eurohard will also be continuing to sell the Dragon 64, both in its original form, and in a redesigned case with a new Spanish keyboard. There may also be keyboards for other languages.

The new version of the 64 will be renamed the Dragon 200, according to Senor Montero.

Eurohard has a prototype of the 200, and may be showing it at the 6809 Show.

Compusense is committed to selling the Dragon 64 as an entry level business machine, states Ted Oprychal.

Ted Oprychal of Compusense.

"It is out total intention to push the 64 with disk drives. The only way forward for Dragon in this country is in a new market area."

Eurohard will not be manufacturing printers. Instead, it is likely that an externally bought printer will be marketed under the Dragon trademark.

Eurohard will be manufacturing a cassette recorder for use with the Dragon, aimed at the Spanish home market.

5¼" disk drives are being designed, with a 320K capacity. They will be compatible with the 32, the 64 and the 200, and have an official launch date of June.

Eurohard also has a 2.8" quick disk system in development, which should be ready by the end of April.

Compusense is unlikely to import the quick disk, however.

"I have my doubts about the applicability of this machine in the British market," Ted Oprychal says.

According to Senor Montero, the sales of the Dragon in Spain are going very well. In the last three months of 1984, Eurohard sold 20,000 units, he claimed.

"The Christmas campaign was a little smaller than envisaged but that affected micros across the board in Spain, not only the Dragon," he says.

January and February were slow, but that was expected.

Eurohard is apparently planning a new marketing tactic in Spain — door-to-door sales of the Dragon.

Ted Oprychal appears to believe that a 128K machine is in the pipeline, probably using OS9 Level Two as an operating system.

"Towards the end of the year, some fairly attractive systems should be produced, especially if Eurohard put in the networking system," he says.

Dark Star

DESIGN DESIGN has just launched a conversion of *Dark Star* for the Dragon.

Dark Star is a space combat game played on a 16 by 16 grid. Each square is a section of a galaxy, and contains a certain number of enemy forces, fuel pods and such. Also dotted about the galactic grid are various planets occupied by the forces of an evil empire.

DARK STAR
Design Design

The player's objective is to get through to each planet, destroy the planetary defences, and liberate the oppressed world. Only after freeing every planet in the galaxy from the yoke of oppression is victory achieved.

Dark Star will cost £7.95. For more information contact Design Design, 2 Ashton Way, East Herrington, Sunderland SR3 3RX.

Mail box

MAILBOX is a new program from Hounslow-based Harris Micro Software for the Dragon 32/64 with Dragondos.

Following the success of the company's personal accounts program, *Moneybox*, *Mailbox* is a name and address databas program, on a 42 column by 24 line screen.

It allows the user to store names and addresses with short notes or flags attached. The program can sort files, only printing those with common flags, for example.

Also included are routines for merging and purging files. *Mailbox* comes on a Dragondos disk, at £14.99. For further information, contact: Harris Micro Software, 49 Alexandra Road, Hounslow, Middlesex TW3 4HP.

Football crazy

ADDICTIVE Games has just converted its best selling title *Football Manager* for the Dragon.

Kevin Toms, who runs Addictive, was responsible for the conversion, and the program includes all the features which have made *Football Manager* number one in the charts across all makes of micro.

for the DRAGON
FOOTBALL MANAGER
DRAGON
Kevin Toms the designer

On the Dragon, *Football Manager* sells for £5.95.

Addictive Games are at 7a Richmond Hill, Bournemouth, Dorset BH2 6HE.

Vidipix

VIDIPIX is a new company with two games for the Dragon, *Jigsaw* and *Combat Air Patrol*. The Corby based company also makes Dragon peripherals to order.

Jigsaw comes with four different screen pictures, which are randomly disassembled into 192 different square blocks. The objective is to recreate the picture.

Combat Air patrol is a flight simulator, with three separate sections. The first involves combat with other aircraft; then comes air to air refuelling, and finally landing.

Both games cost £3.95.

Vidipix will also make a printer interface to order. Called the Printerface, it changes to Centronics port to an RS232 printer interface. Full modem versions may be available later. Printerface costs around £35.00.

Vidipix is at 125 Occupation Road, Corby, Northants NN17 1EG.

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Dragonsoft

New software for review should be sent to *Dragon User*, 12-13 Little Newport Street, London WC2H 7PP.

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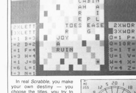
Programs: *Linkword, Darts*
Computerware, PO Box 318, Stoke-on-Trent ST6 6OX
Price: *£5.50 each*

TO VIEW an epic film, however good, on TV after having seen it in true shape and size on the big screen is often something of a disappointment. The same is true of versions of real games mimicked by computer. *Linkword* and *Darts* are cases in point.

Linkword is computerised *Scrabble*, *Darts* is self evident.



In real *Scrabble*, you make your own destiny — you choose the titles, you try to outguess your opponent. The factor which gives most satisfaction in the game is physically handling the letters, arranging and rearranging them on your stands. Keeping the score also gives little Johnny something to do between his turns.

Now much of this is denied to players of *Linkword*. Your letters are chosen by the computer and displayed on the screen for all to see. Your score is automatically added to your total and the double and triple letter and word squares automatically accounted for.

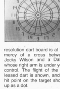
Now all of this does add up to some neat programming. Letters can be placed on the multi-coloured board via a cursor, and options exist for players to exchange any number of letters for others unseen in the pool. End-game facilities are strong.

Even so, all of this adds nothing that cannot be had from a £5.99 "real" *scrabble*.

There is no "acceptable word set" which would delineate the words your are allowed to use (obviously for reasons of memory) and no check is made to allow illegal moves (a new word not connecting with any already on the board, for example). The game does feature a delay so that opponents can object to a move, however.

Linkword seems to be an excellent program, with much enjoyment to be had from it — but it's not a patch on the real thing.

My caveat about *Darts* is much the same. A hi-resolution dart board is at the mercy of a cross between Jocky Wilson and a Dalek, whose right arm is under your control. The flight of the released dart is shown, and its hit point on the target shows up as a dot.



The hardest part of playing real darts — the subtraction — is taken care of by the computer.

The on-screen player can be moved to any part of the screen for better trajectory. The normal rules for darts are adhered to, including the need to end on a double or bull's eye.

The PMODE 4 graphics are fine, the speed of the program is OK, and the players can have some fun. The variables involved in aiming a dart amount to much more than could ever be simulated in a program.

Once again Computerware has produced some excellent coding maximising the features of the Dragon in all respects. But the games themselves are but pale imitations of the real things.

Mike Harrison

Joust a minute

Program: Sky Joust, J Morrison Micros, 4 Rein Gardens, Timgley, W Yorks WF3 1JR.
Price: £3.95.

SKY JOUST is loosely based on the arcade game "Joust". The game involves controlling your Ostrich in a duel against other birds, snakes and nasties using your laser lance to zap them. Failing to kill birds will result in them landing and laying eggs which eventually hatch into even more baddies.

The game begins with just one bird to kill and becomes progressively harder as you continue with a total of three different screens. Pmode 3 graphics are used and are quite impressive, but by no means the best that J Morrison have produced, and apart from the music on the title screen the sound effects are uninspired.

The best thing about this game is its price — just £3.95. The software is not as sophisticated as other versions, such as Buzzard Bait by Microdeal and is therefore not so addictive.

Brian Cadge

Blockbuster quiz

Program: *Blockbuster*, Computerware, PO Box 318, Stoke-on-Trent ST6 60X
Price £5.50

WHEN Charades and Postman's Knock have worn a bit thin over Easter and you've put off that walk you were going to take, the family might turn to a quiz for some competitive entertainment.

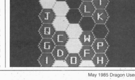
They could do worse than play *Blockbuster*, which follows the style of the TV game of the same name. The idea is to guess answers beginning with a given letter, and trace a route from one side of the screen to the other.

Computerware present the quiz in an efficient and compelling way. Just as in the TV game, you may try to guess the answer before the question is complete — but something like "what W is the opposite of . . ." can leave you in a mess. If you are wrong, your opponent gets the full question. A time limit also applies.

The data is cleverly ordered such that even on completing a round the same questions do not come up again. There are 500 questions altogether to keep you going.

If your general knowledge needs repair or you are a quiz fan, this could be the one for you.

Mike Harrison



Write on!

Phil Brooks *shows how to mix text and graphics on your Dragon*

SEVERAL ROUTINES have been published which attempt to overcome the Dragon's inability to mix text and graphics. Most utilise the "Draw" command to build up the text on the graphics screen. This is a slow process, and if any flexibility is required then a great deal of memory is taken up by all the strings required for a complete set of alphanumeric characters. If lower case is also needed, then even more space is lost. The machine code routine in listing 1 provides a fast, flexible and friendly way to display upper or lower case text and user designed graphics in PMODE4, with the added bonus of double size characters in PMODE2.

WRITE

The machine code contains an extension to the Dragon's Basic interpreter which allows it to recognise the new command "WRITE". This is almost exactly analogous to the usual "PRINT" command, with one or two exceptions. The characters are made up on an 8 × 12 matrix, the lower case letters having true descenders, and WRITING can begin on any of the 192 lines of the screen and in any of the 32 columns by means of the command WRITE @ x, exactly as in PRINT @ x,. In this instance, x defines the upper edge of the first character to be written, so that to move down the page by one text line x must be increased by 12×32. As with the PRINT command, x can be a constant, a variable or an expression, so that WRITE@ 15*32*12+5, SP$ will place SP$ in the fifth column of the fifteenth text line. If there is insufficient space at the bottom of the screen for the first character to be written, or if the position specified is outside the screen, then a BS error will be flagged. If, however, the start position is within limits but the string to be written exceeds the space available then the entire display will scroll up until there is enough space for a complete line of text.

In order to simplify the coding as much as possible, the WRITE command can only operate on strings. To display a constant or a variable it must first be stored as a string, so to write the value of the variable ZZ, use ZZ$=STR$(ZZ):WRITE ZZ$. Pre-defined or immediate strings are accepted, but string manipulation is not possible. Thus 10 WRITE "FREDERICK" and 10 FRED$="FREDERICK" 20 WRITE FRED$ are both acceptable, but WRITE FRED$+"THE GREAT" or WRITE CHR$(65) are not. Single letter string names, such as A$, are not accepted, and will cause a SN ERROR. String arrays are not directly accessible. The required element of an array must first be redefined as a simple array, as in PLACE$=TOWN$(2,4):WRITE PLACE$.

As with the PRINT command, the line terminators "," or ";" can be used to control the write position counter. Two or more strings can be included in one program line if they are separated by one of these separators, as in WRITE AZ$;"THE"; DS$. The write position counter is initially set at 0, but is not reset by a PCLS. It can be reset by using WRITE @ 0,"";. The WRITE command cannot be used in multistatement lines except as the last statement in such a line.

Lower case letters are accessed by means of the shift 0 key, and during programming appear as inverted (green on black) capitals. As well as the full alphanumeric character set (upper and lower case) the program also contains a number of user definable graphics. These are accessed by using a program line such as

60 ALPHA$=CHR$(10):WRITE @ 3000,ALPHA$;

The program in fact contains 122 characters. Listing 2 will enable you to redefine any of the characters to your own specification, and to display the full character set complete with the appropriate ASCII code for each character. For ASCII codes below 33 and from 91 to 96 inclusive the string to be written must first be defined using the CHR$ function as described above. The character set as described in Listing 1 contains 10 special characters, CHR$ (0) to (9), which may be used to display the numbers 0 to 9 when in PMODE3. Some string manipulation will be necessary, but it will make it possible to display a running score in a game, for example. CHR$ (10) to (31) inclusive have been pre-defined as the most used Greek letters, but like every other character, can be redefined using listing 2.

In addition to its use in graphics displays, the routine can of course also be used in text displays.

It is possible to write a complete program in which the normal text screen is never used. Listing 2 is an example of this, and a study of the subroutine in which a string is input to the program without using the normal text page should prove useful.

OWRITE

The routine also recognises three other commands, all with the same structure, limitations and syntax as WRITE. These are: OWRITE, for use when it is required to superimpose text on an existing graphic display, IWRITE for producing inverted characters, in this case black on green or black on buff, and finally IOWRITE, which combines the two. The use of OWRITE or IOWRITE in MODE3 may produce rather strange results.

The routine automatically corrects for whichever page of the graphic memory is in use, so that the WRITE@ position remains constant.

Naturally a change of page after a string has been WRITTEN will result in the screen position of that string changing along with the rest of the display. If PMODE2 is called with the write position counter set at the bottom of the PMODE4 page then a delay will result while it is scrolled to within the normal page limits. The cure is to specify the required position by means of a WRITE@ command.

After typing in listing 1., and before RUNNING it, CSAVE it. The checksum method used will kill 99 per cent of all known bugs, but is not foolproof.

After the program has been RUN type in EXEC 30596, and your extension interpreter will be installed and running. It has no effect on the speed of normal BASIC programs as it only comes into use when the normal interpreter meets an unfamiliar command. To save the machine code, type WRITE@O,""; to reset the position counter, followed by CSAVEM "WRITER", 30596,32767,30596.

Remember always to CLEAR 30596 before reloading the machine code file, and to EXEC it once loaded. If Listing 2 is used to redesign characters then the entire listing should be resaved. Listing 3 is a simple demonstration program to display some of the features of the routines.

Listing 1 BASIC LOADER

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10 REM**"WRITER".  AN EXTENSION
 INTERPRETER FOR THE DRAGON 32 BY
 PHIL BROOKS, 104 BARGATES, LEOMINSTER**
20 CLEAR200,30596
30 FOR CT=30597 TO 32757 STEP 10
40 CS=0:FOR CC=0 TO 9:READ PK$:PK=VAL
("&H"+PK$):CS=CS+PK:POKE CT+CC,PK:NEXT CC
50 READ CK:IF CK<>CS THEN PRINT"DATA ERROR
IN LINE";CT-30497:STOP
60 NEXT CT:POKE32767,0
100 DATA BE,77,91,BF,1,7A,86,7E,B7,1, 1164
110 DATA 79,39,81,80,25,1,39,10,8E,77, 807
120 DATA D2,9E,A6,C6,A,A6,A0,81,2B,27, 1279
130 DATA D,A1,84,26,1D,C1,3,25,19,30, 679
140 DATA 1,5A,20,ED,31,A5,E6,3F,9E,A6, 1191
150 DATA 30,85,9F,A6,34,36,AD,B8,FD,35, 1275
160 DATA 36,86,83,39,31,A5,A6,A4,81,2A, 1091
170 DATA 26,CD,9E,A6,A6,84,39,57,52,49, 1164
180 DATA 54,45,2B,2B,2B,7B,1D,4,4F,57, 601
190 DATA 52,49,54,45,2B,2B,7B,13,5,49, 611
200 DATA 57,52,49,54,45,2B,2B,78,9,5, 615
210 DATA 49,4F,57,52,49,54,45,2B,77,FF, 964
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220 DATA 6,2A,86,1,B7,78,7E,B7,78,7D, 1040
230 DATA 20,1A,86,1,B7,78,7E,7F,78,7D, 994
240 DATA 20,10,86,1,B7,78,7D,7F,78,7E, 984
250 DATA 20,6,7F,78,7E,7F,78,7D,10,9E, 957
260 DATA B7,31,A9,FE,A0,10,BF,78,7A,7F, 1391
270 DATA 78,74,9E,A6,30,1,A6,80,81,20, 1064
280 DATA 27,FA,81,40,26,40,9F,A6,BD,BE, 1240
290 DATA 83,1F,10,D3,BA,1F,3,11,B3,78, 925
300 DATA 7A,10,24,1,E5,FF,78,76,BD,89, 1223
310 DATA AA,D6,B9,1D,FD,78,78,1F,30,93, 1317
320 DATA BA,10,B3,78,78,25,5,B3,78,78, 1082
330 DATA 20,F5,F7,78,7C,9E,A6,20,28,0, 1164
340 DATA 10,6,0,27,E9,1C,A0,0,0,0, 482
350 DATA 9E,A6,30,1,FE,78,76,11,B3,78, 1181
360 DATA 7A,23,3,17,1,F,11,93,BA,24, 585
370 DATA 8,DE,BA,FF,78,76,7F,78,7C,A6, 1446
380 DATA 80,81,20,27,FA,81,22,26,1A,9F, 964
390 DATA A6,A6,80,81,22,27,B,7C,78,74, 1033
400 DATA 81,0,10,27,1,7B,20,EF,BF,78, 890
410 DATA 78,9E,A6,20,41,10,9E,1B,30,1F, 821
420 DATA 9F,A6,9E,A6,A6,80,A1,A4,27,B, 1318
430 DATA 31,21,10,9C,1D,10,27,1,5A,20, 461
440 DATA F1,31,21,A6,80,81,80,27,13,8A, 1070
450 DATA 80,A1,A4,26,DF,A6,80,81,24,27, 1212
460 DATA 7,81,0,26,F6,16,1,3D,31,21, 586
470 DATA E6,A1,BF,78,78,F7,78,74,AE,A0, 1639
480 DATA 7D,78,74,26,15,A6,1,81,0,10, 732
490 DATA 27,1,E,81,3B,10,27,0,B2,30, 523
500 DATA 1,A6,84,16,0,CC,A6,80,C6,C, 1029
510 DATA 3D,C3,7A,3C,1F,2,11,B3,78,7A, 909
520 DATA 23,2,8D,71,96,B9,C6,C,81,20, 997
530 DATA 26,19,A6,A0,7D,78,7E,27,1,43, 867
540 DATA 7D,78,7D,27,2,AA,C4,A7,C4,33, 1191
550 DATA C8,20,5A,26,E9,20,1C,A6,A0,7D, 1104
560 DATA 78,7E,27,1,43,7D,78,7D,27,2, 764
570 DATA AA,C4,A7,C4,33,C8,10,A7,C4,33, 1410
580 DATA C8,10,5A,26,E4,33,C9,FE,81,FF, 1462
590 DATA 78,76,7C,78,7C,B6,78,7C,91,B9, 1362
600 DATA 26,1B,8D,2,20,17,33,C9,1,60, 612
610 DATA FF,78,76,7F,78,7C,96,B9,81,10, 1344
620 DATA 26,6,33,C8,10,FF,78,76,39,7A, 983
630 DATA 78,74,27,34,16,FF,7D,34,36,9E, 993
640 DATA BA,31,88,20,EC,A1,ED,81,10,9C, 1338
650 DATA B7,25,F7,CC,0,0,ED,81,9C,B7, 1376
660 DATA 25,FA,33,C8,E0,11,B3,78,7A,24, 1236
670 DATA E0,FF,78,76,35,36,39,11,B3,78, 1197
680 DATA 7A,25,2,8D,D0,39,BE,78,78,A6, 1163
690 DATA 84,9F,A6,81,0,27,42,81,3B,26, 917
700 DATA 9,A6,1,81,0,27,E2,16,FE,98, 998
710 DATA 81,2C,10,26,0,45,96,B9,47,B7, 885
720 DATA 78,75,B1,78,7C,25,10,B0,78,7C, 1131
730 DATA 33,C6,B6,78,75,B7,78,7C,FF,78, 1470
740 DATA 76,20,A,96,B9,B0,78,7C,33,C6, 1164
750 DATA 17,FF,6D,A6,1,81,0,10,26,FE, 991
760 DATA 65,20,AA,30,1F,9F,A6,96,B9,B0, 1218
770 DATA 78,7C,33,C6,FF,78,76,7F,78,7C, 1357
780 DATA 17,FF,4F,20,94,C6,2,7E,83,44, 1062
790 DATA C6,10,7E,83,44,0,0,30,CC,CC, 995
800 DATA CC,CC,CC,CC,30,0,0,0,0,F0, 1104
810 DATA 30,30,30,30,30,30,FC,0,0,0, 540
820 DATA 0,30,CC,C,C,30,30,C0,FC,0, 816
830 DATA 0,0,0,30,CC,C,30,C,C,CC, 540
840 DATA 30,0,0,0,0,C0,C0,C0,CC,CC, 1032
850 DATA FC,C,C,0,0,0,0,FC,C0,C0, 912
860 DATA F0,C,C,CC,30,0,0,0,0,30, 564
870 DATA CC,C0,F0,CC,CC,CC,30,0,0,0, 1296
880 DATA 0,FC,C,C,30,30,C0,C0,C0,0, 948
890 DATA 0,0,0,30,CC,CC,30,CC,CC,CC, 1116
900 DATA 30,0,0,0,0,30,CC,CC,CC,3C, 768
910 DATA C,CC,30,0,0,0,0,0,0,62, 362
920 DATA 94,88,94,62,0,0,0,0,10,28, 586
930 DATA 44,44,78,44,44,78,40,40,40,0, 704
940 DATA 0,0,0,44,A2,12,14,8,10,20, 324
950 DATA 20,0,18,20,20,10,28,44,44,38, 368
960 DATA 0,0,0,0,0,0,0,1C,20,78, 180
970 DATA 20,1C,0,0,0,0,14,8,10,10, 120
980 DATA 10,8,4,8,0,0,0,0,0,0, 36
990 DATA 0,70,48,48,48,48,8,8,4,0, 420
1000 DATA 0,10,28,44,7C,44,28,10,0,0, 372
1010 DATA 0,0,0,20,50,8,18,24,42,42, 312
1020 DATA 0,0,0,0,0,0,0,44,44,44, 204
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1030 DATA 44,78,40,40,80,0,0,0,0,7E, 570
1040 DATA 24,24,24,22,0,0,0,0,0,0, 142
1050 DATA 0,18,24,44,44,78,40,40,40,0, 508
1060 DATA 0,0,0,3E,50,48,48,30,0,0, 334
1070 DATA 0,0,0,0,2,3C,50,10,14,8, 186
1080 DATA 0,0,0,0,8,10,10,38,54,54, 264
1090 DATA 54,38,10,10,20,0,0,8,10,92, 374
1100 DATA 92,92,54,38,10,10,20,0,7E,42, 688
1110 DATA 40,40,40,40,40,40,0,0,0,0, 384
1120 DATA 0,0,0,44,82,92,92,6C,0,0, 598
1130 DATA 0,0,10,10,28,28,44,44,82,FE, 632
1140 DATA 0,0,0,0,10,10,28,28,44,44, 248
1150 DATA 82,82,0,0,0,0,7E,20,10,8, 442
1160 DATA 8,10,20,7E,0,0,0,0,0,38, 238
1170 DATA 44,82,82,44,28,EE,0,0,0,0, 674
1180 DATA 0,0,0,0,0,0,0,0,0,0, 0
1190 DATA 0,0,10,10,10,10,10,10,0,10, 112
1200 DATA 0,0,0,0,28,28,28,0,0,0, 120
1210 DATA 0,0,0,0,0,0,0,28,28,7C, 204
1220 DATA 28,7C,28,28,0,0,0,0,0,10, 260
1230 DATA 38,50,38,14,38,10,0,0,0,0, 284
1240 DATA 64,64,8,8,10,10,26,26,0,0, 324
1250 DATA 0,0,10,28,28,10,2A,24,2A,10, 248
1260 DATA 0,0,0,0,10,10,10,0,0,0, 48
1270 DATA 0,0,0,0,0,0,8,10,20,20, 88
1280 DATA 20,20,10,8,0,0,0,0,20,10, 136
1290 DATA 8,8,8,8,10,20,0,0,0,0, 80
1300 DATA 0,0,54,38,7C,38,54,0,0,0, 404
1310 DATA 0,0,0,0,10,10,7C,10,10,0, 188
1320 DATA 0,0,0,0,0,0,0,0,0,0, 0
1330 DATA 18,8,10,0,0,0,0,0,0,0, 48
1340 DATA 0,7C,0,0,0,0,0,0,0,0, 124
1350 DATA 0,0,0,0,18,18,0,0,0,0, 48
1360 DATA 4,4,8,8,10,10,20,20,0,0, 120
1370 DATA 0,0,10,28,44,44,44,44,28,10, 384
1380 DATA 0,0,0,0,10,30,10,10,10,10, 128
1390 DATA 10,38,0,0,0,0,38,44,4,8, 208
1400 DATA 10,20,40,7C,0,0,0,0,38,44, 360
1410 DATA 4,38,4,4,44,38,0,0,0,0, 192
1420 DATA 8,18,28,48,7C,8,8,8,0,0, 292
1430 DATA 0,0,7C,40,40,78,4,4,44,38, 504
1440 DATA 0,0,0,0,38,44,40,78,44,44, 444
1450 DATA 44,38,0,0,0,0,7C,4,8,8, 268
1460 DATA 10,10,20,20,0,0,0,0,38,44, 220
1470 DATA 44,38,44,44,44,38,0,0,0,0, 384
1480 DATA 38,44,44,44,3C,4,44,38,0,0, 448
1490 DATA 0,0,0,0,0,18,18,0,18,18, 96
1500 DATA 0,0,0,0,0,0,0,18,18,0, 48
1510 DATA 18,8,10,0,0,0,0,0,6,18, 78
1520 DATA 60,18,6,0,0,0,0,0,0,0, 126
1530 DATA 0,7C,0,0,7C,0,0,0,0,0, 248
1540 DATA 0,0,60,18,6,18,60,0,0,0, 246
1550 DATA 0,0,38,44,4,18,20,20,0,20, 248
1560 DATA 0,0,0,0,3C,42,9A,AA,AA,94, 768
1570 DATA 40,38,0,0,0,0,10,28,44,44, 312
1580 DATA 7C,44,44,44,0,0,0,0,38,24, 420
1590 DATA 24,38,24,24,24,38,0,0,0,0, 256
1600 DATA 18,24,40,40,40,40,24,18,0,0, 376
1610 DATA 0,0,38,24,24,24,24,24,24,38, 328
1620 DATA 0,0,0,0,3C,20,20,38,20,20, 244
1630 DATA 20,3C,0,0,0,0,3C,20,20,38, 272
1640 DATA 20,20,20,20,0,0,0,0,18,24, 188
1650 DATA 40,40,4C,44,24,18,0,0,0,0, 332
1660 DATA 24,24,24,3C,24,24,24,24,0,0, 312
1670 DATA 0,0,38,10,10,10,10,10,10,38, 208
1680 DATA 0,0,0,0,1C,8,8,8,8,8, 68
1690 DATA 48,30,0,0,0,0,44,48,50,60, 436
1700 DATA 60,50,48,44,0,0,0,0,20,20, 380
1710 DATA 20,20,20,20,20,3C,0,0,0,0, 220
1720 DATA 82,C6,AA,92,82,82,82,82,0,0, 1164
1730 DATA 0,0,24,24,34,34,2C,2C,24,24, 336
1740 DATA 0,0,0,0,38,44,44,44,44,44, 396
1750 DATA 44,38,0,0,0,0,38,24,24,24, 288
1760 DATA 38,20,20,20,0,0,0,0,10,28, 208
1770 DATA 44,44,54,4C,2C,12,0,0,0,0, 358
1780 DATA 38,24,24,24,38,30,28,24,0,0, 344
1790 DATA 0,0,18,24,20,18,4,4,24,18, 184
1800 DATA 0,0,0,0,7C,10,10,10,10,10, 204
1810 DATA 10,10,0,0,0,0,44,44,44,44, 304
1820 DATA 44,44,44,38,0,0,0,0,44,44, 396
1830 DATA 44,28,28,28,10,10,0,0,0,0, 220
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1840 DATA 82,82,82,82,92,AA,C6,82,0,0, 1164
1850 DATA 0,0,42,42,24,18,18,24,42,42, 384
1860 DATA 0,0,0,0,44,44,28,28,10,10, 248
1870 DATA 10,10,0,0,0,0,7C,8,8,10, 188
1880 DATA 10,20,20,7C,0,0,0,0,10,10, 236
1890 DATA 10,92,54,38,10,0,0,0,0,0, 318
1900 DATA 8,10,20,7E,20,10,8,0,0,0, 238
1910 DATA 0,0,10,8,4,7E,4,8,10,0, 182
1920 DATA 0,0,0,0,18,24,20,78,20,20, 276
1930 DATA 20,7C,0,0,0,0,10,38,54,92, 458
1940 DATA 10,10,10,0,0,0,0,0,20,20, 112
1950 DATA 10,10,8,8,4,4,0,0,0,0, 56
1960 DATA 0,0,0,38,4,3C,44,3A,0,0, 246
1970 DATA 0,0,40,40,40,78,44,44,44,78, 636
1980 DATA 0,0,0,0,0,0,0,38,40,40, 184
1990 DATA 40,38,0,0,0,0,4,4,4,3C, 192
2000 DATA 44,44,44,3C,0,0,0,0,0,0, 264
2010 DATA 0,38,44,7C,40,38,0,0,0,0, 368
2020 DATA 18,24,20,38,20,20,20,20,0,0, 276
2030 DATA 0,0,0,0,0,3C,44,44,44,3C, 324
2040 DATA 4,4,38,0,20,20,20,38,24,24, 288
2050 DATA 24,24,0,0,0,0,0,0,10,0, 88
```

```
2060 DATA 30,10,10,38,0,0,0,0,0,0, 136
2070 DATA 8,0,18,8,8,8,8,8,30,0, 120
2080 DATA 20,20,20,24,28,30,28,24,0,0, 296
2090 DATA 0,0,30,10,10,10,10,10,10,38, 200
2100 DATA 0,0,0,0,0,0,0,28,54,54, 208
2110 DATA 54,54,0,0,0,0,0,0,0,38, 224
2120 DATA 24,24,24,24,0,0,0,0,0,0, 144
2130 DATA 0,38,44,44,44,38,0,0,0,0, 316
2140 DATA 0,0,0,78,44,44,44,78,40,40, 572
2150 DATA 40,0,0,0,0,3C,44,44,44,3C, 388
2160 DATA 4,4,4,0,0,0,0,2C,30,20, 136
2170 DATA 20,20,0,0,0,0,0,0,0,38, 120
2180 DATA 40,38,4,38,0,0,0,0,0,20, 212
2190 DATA 20,3C,20,20,24,18,0,0,0,0, 216
2200 DATA 0,0,0,24,24,24,24,1C,0,0, 172
2210 DATA 0,0,0,0,0,44,44,28,28,10, 232
2220 DATA 0,0,0,0,0,0,0,44,54,54, 236
2230 DATA 54,28,0,0,0,0,0,0,0,44, 192
2240 DATA 28,10,28,44,0,0,0,0,0,0, 164
2250 DATA 0,24,24,24,24,1C,4,4,18,0, 204
2260 DATA 0,0,0,7C,8,10,20,7C,0,0, 304
```

Listing 2 CHARACTER DESIGNER

```
10 REM CHARACTER DESIGNER FOR USE WITH 'WRITER' EXTENSION INTERP
RETER BY PHIL BROOKS, 104 BARGATES, LEOMINSTER, HEREFORDSHIRE.
20 DIM CS(10),BL(10):BL$=STRING$(18,32)
30 PMODE 4,1:PCLS:WRITE@0,"*";
40 GET(0,2)-(6,8),CS,G:GET (10,2)-(16,8),BL,G:WRITE@0," ";
50 PCLS:SCREEN 1,1:IWRITE@38,"CHARACTER  DESIGNER";
60 WRITE@1152," 1.  Redesign a character";
70 WRITE@1536," 2.  Display the full character set";
80 WRITE@3072,"Please select the option you    require by pressi
ng the          appropriate key"
90 OP$=INKEY$: IF OP$="" OR OP$<"1" OR OP$>"2"THEN 90 ELSE OP=VA
L(OP$):ON OP GOTO 100,500
100 PCLS
110 WP=3840:WRITE@1536,"Please input the ASCII code for the char
acter you wish to change";
120 GOSUB 610
130 PCLS
140 IWRITE @ 38,"CHARACTER  DESIGNER";
150 FOR Y=16 TO 112 STEP 8:LINE(8,Y)-(72,Y),PSET:NEXT Y
160 FOR X=8 TO 72 STEP 8: LINE(X,16)-(X,112),PSET:NEXT X
170 WRITE@522,"Move the cursor with";
180 WRITE@906,"the arrow keys";
190 WRITE@1482,"Press 'S' to set a";
200 WRITE@1866,"point, 'C' to clear";
210 WRITE@2250,"it";
220 WRITE@2826,"Press 'E' to enter";
230 WRITE@3210,"design into memory,";
240 WRITE@32*13+3210,"'A' to abandon design"
250 CD$="ASCII"+STR$(AS)+" at present looks like "
260 WRITE@4160,CD$
270 LINE(119,141)-(128,154),PSET,B
280 CH$=CHR$(AS):WRITE@4559,CH$
290 X=9:Y=17:FL=0
300 PUT(X,Y)-(X+6,Y+6),CS,PSET
310 FOR T=1 TO 30:NEXT
320 IF FL=0 THEN PUT(X,Y)-(X+6,Y+6),BL,PSET ELSE PUT(X,Y)-(X+6,Y
+6),BL,PRESET
330 FOR T=1 TO 30:NEXT
340 RR$=INKEY$:IF RR$=""THEN 300
350 IF RR$="S" THEN PUT(X,Y)-(X+6,Y+6),BL,PRESET ELSE IF RR$="C"
THEN PUT (X,Y)-(X+6,Y+6),BL,PSET
360 IF RR$="E" THEN 420ELSE IF RR$="A" THEN 50
```

```
370 RR$=INKEY$
380 X=X-8*(PEEK(344)=223)+8*(PEEK(343)=223):IF X>65 THEN X=9 ELS
E IF X<9 THEN X=65
390 Y=Y-8*(PEEK(342)=223)+8*(PEEK(341)=223):IF Y>105 THEN Y=17 E
LSE IF Y<17 THEN Y=105
400 IF PPOINT(X+3,Y+3)=0 THEN FL=0 ELSE FL=1
410 GOTO 300
420 PS=31292+12*AS
430 FOR Y=20 TO 108 STEP 8
440 X=68:BV=0
450 FOR CT=0 TO 7
460 IF PPOINT(X,Y)<>0 THEN BV=BV+2^CT
470 X=X-8:NEXT CT
480 POKE PS,BV:PS=PS+1:NEXT Y
490 GOTO 50
500 PMODE4,1:PCLS:SCREEN1,1
510 WRITE@0,"Display may be started and","stopped by pressing th
e spacebar"
520 GOSUB590:FOR CT=0 TO 122
530 CT$=STR$(CT)+" ":WRITE CT$;
540 CH$=CHR$(CT):WRITE CH$,
550 HD$=INKEY$:IF HD$=" " THEN GOSUB 590
560 NEXT CT:WRITE""
570 WRITE"Press spacebar to continue";
580 GOSUB590:GOTO 50
590 RT$=INKEY$:IF RT$=" " THEN RETURN ELSE 590
600 REM ***SUBROUTINE TO INPUT A TEXT STRING IN HI-RES***
610 WRITE@WP,"?";:REM**SET POSITION FOR DISPLAYING INPUT**
620 IN$="":REM**IN$ WILL HOLD THE FINAL INPUT STRING**
630 IP$=INKEY$:IF IP$=""THEN 630 ELSE IF IP$=CHR$(13) THEN 690:R
EM**CHECK FOR KEY PRESSED.  IF 'RETURN' THEN 710**
640 IF IP$=CHR$(8) AND LEN(IN$)>0 THEN IN$=LEFT$(IN$,LEN(IN$)-1)
 ELSE 660:REM**CHECK FOR BACKSPACE AND SHORTEN IN$ ACCORDINGLY**
650 WRITE@WP,IN$;BL$:REM**DISPLAY IN$ SO FAR**
660 IF IP$<"0" OR IP$>"9" THEN 630:REM**LIMIT INPUT TO INTEGER N
UMERAL, MAY BE OMITTED FOR STRING OR DECIMAL INPUTS**
670 IN$=IN$+IP$:WRITE@WP,IN$;BL$:REM**ADD LAST KEY PRESSED TO IN
$**
680 GOTO 630:REM**GO BACK TO CHECK FOR NEXT KEY PRESSED**
690 AS=VAL(IN$):IF AS>9 AND AS<123 THEN RETURN ELSE IWRITE@WP,"U
NACCEPTABLE ENTRY":REM**CONVERT IN$ INTO AN NUMERIC VALUE AND CH
ECK THAT IT IS WITHIN LIMITS. RETURN IF O.K. ELSE DO AGAIN**
700 GOTO 620
```

Listing 3 DEMONSTRATION PROGRAM

```
10 REM **DEMONSTRATION PROGRAM FOR 'WRITER' EXTENSION INTERPRETE
R BY PHIL BROOKS**
20 PMODE 4,1:PCLS:SCREEN1,1
30 IWRITE @ 38,"QUADRATIC EQUATIONS";
40 WRITE @ 32*15,"There are three normal methods  for solving qu
adratic equations","  1.  Graphical"," ","  2.  By factorising",
"  3.  By use of the formula"
50 WRITE""
60 WRITE"This program will attempt to    demonstrate each of the
se in    turn."
70 WRITE"Solve";
80 WRITE@4490,"x +3x-4=0"
90 WRITE @ 4363,"2";
100 WRITE@5186,"Press spacebar to continue"
110 GOSUB 900
120 PCLS
130 LINE(16,150)-(236,150),PSET:FOR C=16 TO 246 STEP 20:LINE(C,1
48)-(C,152),PSET:NEXT C
140 XX$="-x":WRITE@4608,XX$;
```

```
150 XX$="+x":WRITE@4638,XX$;
160 LINE(156,6)-(156,186),PSET:FOR C=6 TO 186 STEP 6:LINE(154,C)
-(158,C),PSET:NEXTC
170 WRITE@18,"y";
180 WRITE@5745,"-y";
190 FOR X=-7 TO 4:XX$=STR$(X):IFX=0 THEN 220
200 XA=4865+((7+X)/12)*30:XA=INT(XA)
210 OWRITE@XA,XX$;
220 NEXT X
230 YA=83
240 FOR Y=24 TO 4 STEP -4:YY$=STR$(Y):OWRITE@YA,YY$;
250 YA=YA+32*24:NEXT Y
260 YA=1+YA+32*22:OWRITE@YA,"-4";
270 YA=YA+32*12:OWRITE@YA,"-6";
280 WRITE@68,"Graph of";
290 WRITE@708,"y=x +3x-4";
300 WRITE@711-32*5,"2";
310 FOR X=-7 TO X=0 STEP 0.02:GOSUB340:NEXT X
320 FOR X=0 TO 4 STEP 0.02:GOSUB 340:NEXT X
330 GOTO380
340 Y=X^2+3*X-4
350 XX=156+20*X:YY=150-6*Y
360 PSET(XX,YY,5)
370 RETURN
380 WRITE@1190,"when y=0";
390 WRITE@1579,"x=-4";
400 WRITE@1960,"or x=+1";
410 OWRITE@5185,"Press spacebar";
420 WRITE@5569,"to continue";
430 GOSUB900
440 PCLS:IWRITE@42,"FACTORISING";
450 WRITE@32*24,"The equation"
460 WRITE@24*32+15,"x +3x-4=0"
470 WRITE@19*32+16,"2"
480 WRITE@38*32,"can be factorised and written"
490 WRITE@52*32+12,"(x-1)(x+4)=0"
500 WRITE@64*32,"for this to be true then either"
510 WRITE@78*32+4,"(x-1)=0   or   (x+4)=0"
520 WRITE@100*32,"this means that either"
530 WRITE@135*32+6,"x=+1     or      x=-4"
540 WRITE@179*32+3,"Press spacebar to continue";
550 GOSUB900:PCLS:IWRITE@44,"FORMULA"
560 WRITE@20*32,"any equation in the form"
570 WRITE@38*32+8,"ax +bx+c=0"
580 WRITE@33*32+10,"2"
590 WRITE@50*32,"can be solved by substituting   in the formula"
600 WRITE@80*32+9,"x="
610 LINE(88,85)-(168,85),PSET
620 OWRITE@76*32+11,"-b= b -4ac"
630 WRITE@73*32+16,"2"
640 LINE(107,78)-(107,83),PSET
650 LINE(112,81)-(114,83),PSET:LINE-(122,72),PSET:LINE-(168,72),
PSET
660 OWRITE@85*32+15,"2a"
670 WRITE@105*32,"to give  x="
680 LINE(88,110)-(208,110),PSET
690 OWRITE@101*32+11,"-3= 3 -(-4) 1 4"
700 OWRITE@100*32+22,"x x"
710 WRITE@97*32+16,"2"
720 LINE(107,103)-(107,108),PSET
730 LINE(112,105)-(114,107),PSET:LINE-(122,97),PSET:LINE-(208,97
),PSET
740 OWRITE@110*32+17,"2 1"
750 OWRITE@109*32+18,"x"
760 WRITE@124*32,"i.e.  x=         or x="
770 LINE(64,129)-(125,129),PSET:LINE(170,129)-(232,129),PSET
780 OWRITE@120*32+8,"-3+ 9+16"
790 OWRITE@120*32+21,"-3- 9+16"
800 LINE(90,126)-(92,128),PSET:LINE-(96,119),PSET:LINE-(127,119)
,PSET:LINE(193,126)-(195,128),PSET:LINE-(200,119),PSET:LINE-(232
,119),PSET
810 OWRITE@129*32+11,"2            2"
820 WRITE@150*32,"i.e.      x=1    or      x=-4"
830 WRITE@179*32+3,"press spacebar to continue";
840 GOSUB900
850 PCLS
860 WRITE@0,"  There is another method for   solving a quadratic
 equation    which is beyond the scope of    this.demonstration,
 although it is particularly suited to use incomputer applicatio
ns.  It is   known as 'Iteration', and is a"
870 WRITE"means of solving by making a    series of approximatio
ns to the true value until a satisfactory match is found"
880 WRITE@160*32,"push spacebar to end"
890 GOSUB900:CLS:END
900 IF INKEY$=" " THEN RETURN ELSE 900
```

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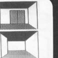

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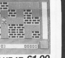

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Correcting the faults and problems with Dragondos

***P G Scott** solves the problems that face unwary users of Dragon DOS.*

FOR SOME TIME it has been known that there are a number of faults and problems associated with DRAGONDOS 1.0, over and above the documentation. This article is intended to identify and highlight some of these problems and propose solutions (which have been running successfully on my own system). While I do not advocate "patching" object code, in this instance, without the source, there is no alternative.

The rest of the article has been separated into three areas:

Faults, where the system performs erroneously and it is not possible to overcome the error without manual interaction,

Problems, where it is possible to program around the problem or there is need of information not provided in the manual, and

Lack of information, where facilities exist that are not documented.

In what follows, a single sentence description of the error is given followed by amplification of the cause and effects of the error together with a simple test, if applicable, and a patch to correct the error. Within the patches, the format is:

+xxxx yy zz

where +xxxx is the location address in the EPROM and corresponds to run-time address &HC000+&Hxxxx and yy zz are the Hex values to be programmed into consecutive locations.

FAULTS

Fault 1: USR09 address is corrupted and Drive 4 is not set to "unused" at RESET.

These two faults have no apparent link, but are actually caused by a single erroneous byte in the RESET initialisation sequence. As a result of the error, any attempt to use the USR09 function before setting the address will cause program corruption rather than ?FC error, while a change of disk format (from single sided to double sided for example) will not be detected for drive 4, but will for the other drives (see hints).

It is possible to issue commands to cancel this fault, but it requires the sequence

POKE &H69A,0 : DEF USR9=&H8B8D

to be obeyed after EVERY reset.

Test: A=USR09(A)

Patch: +00BF

Fault 2: System "hangs" if in graphics mode and drive not ready.

This error occurs because the system tests for graphics mode (for some unknown reason) and, if set, waits for an interrupt which cannot occur. This can be avoided by ensuring a disk is always available when in graphics mode.

Test: SCREEN 1,1 : DIR

Patch: +02EB 21

+0316 21

Fault 3: Directory track 16 update failure — results are not predictable.

After writing to disk, directory track 16 has to be updated to match track 20. The effect of this fault is that a failure while reading track 20 or writing track 16 will cause the processor to return to a random address as the stack is not reset properly. this can only be fully overcome by applying the specified patch.

Test: POKE &H6AB,1 : EXEC &HC734

with a) no disk, and b) disk write protected

Patch: +0771 26 21

+0793 5F 32 48

+07A8 32 48

Fault 4: Track 19 sector 36 is corrupted when files are killed.

This fault is only encountered when using double-sided 80 track disks. Directory sectors 1 and 2 contain a "bit map" showing whether a disk sector is in use or free. When a file using sectors on tracks 40 to 79 is "KILLed", the sectors allocated to it are returned for re-use, but track 19 sector 36 is written instead of track 20 sector 2. This can only be corrected by applying the patch.

Test: DIR : CREATE "FILE",400000 : KILL "FILE.DAT" : DIR

Patch: +1027 21

Fault 5: Filename validation exits to the BASIC error routine.

This error only affects machine code users, as calling the file specification validation routine will exit to BASIC If a ?DN error occurs, instead of returning the error code in the B accumulator (the method of using this and the other 17 routines available to machine code users will need to be the subject of a later article). This is only correctable by applying the patch.

Patch: +0802 23 04 81 04 23 04

C6 28 39 12

Fault 6: BASIC file protection and rename routines addressed instead of the machine code routines.

This error only affects machine code users, as the routines referenced in DRAGONDOS 1.0 use the "character getter" routine at &H9F to get a file specification and return to BASIC if a file protection or rename error occurs. The routines that are called by the BASIC commands and should be called from machine code can be used by making the changes detailed.

Patch: +001C D0 9D CF

Fault 7: Errors in freeing a disk buffer cause random effects.

As there are only four disk buffers available, accessing more than four files requires these buffers to be re-allocated. This fault occurs when writing to a file to free a disk buffer for re-use. If a failure occurs, the stack is not reset properly and the command returns to a random address. Only patching the EPROM will correct the fault.

Patch: +1297 27 02 E7 61

Fault 8: Only five files may be opened by a BASIC program.

The manual states that 10 files may be open at one time, clearly in conflict with the actual situation. It is caused by allocating file control blocks to ".BAK" files (whether a ".BAK" file is created or not) and not freeing them when no longer required. Without a re-write of DOS, it is not possible to totally eliminate this fault, but the patch described will allow 10 files to be referenced (note that "KILLing" or "PROTECTing" a file counts as a file reference, while "CREATEing" a file with backup counts as two file references).

This patch also has the effect of removing one carriage return from the end of the DRAGONDOS sign-on message, in order to gain sufficient space in the EPROM.

Test: FOR I=1 TO 10 : PRINT I : CREATE "FILE"+CHR$ ▶

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```
◄         (64+I) : NEXT I
  Patch:  +0F3C   6D 03
          +0F45   27 0A
          +0F4F   30 0C 6F 14 BD
          DF CA 27 11
          +1FC9   00 B6 06 7D 6D
          9F 06 78 39
```

Fault 9: CLOSE always closes all files. This fault also contradicts the manual. Indeed CLOSE #−1 closes all disk files as well as the cassette file. The facility for selective closure was partially programmed and never implemented, however. **Patch a** (which requires correction of problem 2 first) will permit the CLOSE command to operate as described in the manual. In addition, the patch uses &HF7 as a control and if this is set to a non-zero value the patch will close the last file referenced, provided CLOSE has a parameter in the range 1 to 4. **Patch b** ensures that CLOSE operates as described in the manual after a reset or "DSKINIT".

The suggested method of closing individual files is as follows. Use POKE &HF7,1 to turn on the facility (and POKE &HF7,0 to turn it off), then in the enabled state use

```
CLOSE EOF ("file1"),EOF("file2")
```

to close the files only when the end of file is reached (CLOSE 0 is ignored), or

```
CLOSE 1+EOF ("file1"),1+EOF("file2")
```

to close the files independent of the EOF condition (note that more than one parameter may be specified with CLOSE). The use of EOF here ensures that the required file is the last accessed. This method has to be used as CLOSE will only accept numeric parameters.

```
  Test:    FREAD "FILE";A$ : PRINT
           A$ : CLOSE #-1 : FREAD
           "FILE", A$ : PRINT A$
  Patch a:  Correct problem 2
            +0EBC   09
            +16FC   09
            +170B   5D 2F FC 0F 6F
            32 62 0D F7 26 0A
            +1720   BD CE D3 20 F6
            +1EA3   D6 FB D7 0B
  Patch b:  +00C0   DC 8A ED 84
            ED 02   DD F6
            +00D4   12 12
```

Fault 10: Disk motor control assumes DP set to zero.

This fault affects machine code users, where use is made of direct pages other than page zero. The motor countdown routine assumes that DP = 0 for tests on the flag, and can cause data or disk corruption if this is zero.

```
  Patch:  +0700   20 22
          +71E   20 0D
          +724   34 04 4F 1F 8B 0D
          F6 20 D5 35 04 7E 9D 3D
```

PROBLEMS

Problem 1: LOC/LOF/FREE functions sometimes return a negative value.

All three functions use the same routine to convert a 24 bit integer to BASIC numeric format. Because the sign is not cleared, this routine returns a value with the sign of the value calculated immediately before calling the function. It can be corrected by applying the patch supplied or using the ABS function to ensure a positive value is returned.

```
  Test:   PRINT #-2,FREE or I=-1 :
          PRINT FREE
  Patch:  +1D94   12 5F
          +1D98   DD 53
          +1D9E   DD
```

Problem 2: INPUT/LINEINPUT cause all disk files to be closed.

If you have tried writing a simple file edit program, you will have met this problem. It is caused by the need to ensure all files are closed at the end of a program. The problem can be overcome by using LOC and FREAD FROM to reset the read pointers (FWRITE does not suffer from this problem), or by applying the patch to correct problem 1 above and then applying patch a. Alternatively, without applying the problem 1 patch, memory can be reserved (from &H7FEF for example) containing patch b and the hook vector changed by using:

```
POKE &H182,&H39 : POKE &H184,&HEF :
POKE &H183,&H7F : POKE &H182,&H7E
```

This patch is position independent, so can be put anywhere in memory, provided locations &H183/4 are set accordingly. This change will remain effective until a cold start occurs.

```
  Test:   FREAD "FILE",A$ : PRINT
          A$ : INPUT B$ : FREAD
          "FILE",A$ : PRINT A$

  Patch a:  Correct problem 1
            +1AB7   BD DD 95 7E 95
            82 34 56 8E 83 7D AC
            68 26
            +1AC5   05 BD D6 FB 20
            5E 35 D6
            +1EAD   DA BD
  Patch b:  +FEF   34 56 8E 83 7D
            AC 68 26 06 BD D6 FB
            7E DB 29 35 D6
```

Problem 3: "SAVE" can create a file entry which cannot be "KILLed".

This is an avoidable problem, but can occur if ENTER is hit instead of —. The remedy is to alter the directory entry for the file (by using SREAD and SWRITE) to a name that will allow the file to be killed. The alternative of marking the directory entry as killed is not recommended as this does not return any sectors allocated to the file. The patch listed rejects a null file specification as ?FS error.

```
  Test:    SAVE ""
  Patch:  +O7BE   7E DF F3
          +1FF3   5D 26 03 C6 96
          39 B6 06 0A 7E C7 C1
```

Problem 4: Files "KILLed" within a program are left open, causing data written immediately after "KILL" to be lost.

This problem can be overcome by inserting extra program statements around the "KILL" either to create a zero length file for the same name before or after "KILL" (provided a ".BAK" file does not exist that is still required, as this action causes the ".BAK" file to be killed), or to close all files after "KILL" is used (remembering to retain any input file pointers through LOC). Alternatively, the patch listed can be applied (after correction problem 2 above). This patch also prevents sectors being "lost" due to a ?PE error occuring when attempting to write to a zero length file after it is 'KILLed" in a program. It also returns the file control block for re-use on completion of the "KILL" command (see also fault 8).

```
  Test:   A$="FILE.DAT" : FWRITE
          A$,"TEST": KILL A$ : FWRITE
          A$; "NEXT LINE"

  Patch:  Correct problem 2
          +1720   BD CE D3 20 F6
          +177C   27 A2
          +179D   20 DD 12
          +17BF   20 BB 12
```

Problem 5: Drives (other than drive 1) incorrectly assumed to be restored to track zero at first access.

With this problem, the first drive access after startup assumes the head is at track zero and steps on 20 tracks to read the disk format from the directory, then corrects by issuing a restore and stepping correctly to track 20. This can cause the drive to attempt to step beyond its last track. The patch described restores the drive to track 0 the first time it is accessed after startup.

In order to insert this patch, some reset features have been changed — Drive 1 no longer restores to track zero at switch on, the copyright and DRAGONDOS messages all remain on screen and the system becomes ready more quickly.

```
  Test:   DIR 2
  Patch:  +009E   8E DF BA BD 90
          E5 7E 83 71 A7 C8 10 6D
          44 26 07
          +00AE   BD C1 65 24 02
          32 62 39
          +1197   BD C0 A7
```

Problem 6: "BACKUP" to an unformatted disk is not allowed, "DSKINIT" does not check for a formatted disk, and "DISKINIT"/"BACKUP" are available in program mode.

Lack of free space in the EPROM prevents patches to correct or change this remaining group of problems, which are included for information (and warning).

HINTS

The "FWRITE" command uses "PRINT", with &H6F set to 1, to output data to the disk, hence ANY "PRINT" format is acceptable after the filename parameter and delimiter: for example

```
FWRITE "TESTFILE"; USING"TEST LINE
FOR FWRITE,###.##" 2*3.14
```

As "PRINT" uses the character output routine accessed through [&HA002], it is possible to use this routine to output to disk from machine code programs. However, this requires knowledge of other routines accessible within DRAGONDOS and is beyond the scope of this article.

The disk directory contains information on the disk format (number of tracks and sectors) which is loaded during the first disk access after a reset.

Thus single/double sided disks may be interchanged in a double sided drive and will be updated correctly provided either the system is reset or location (&H696 + drive number) is set to zero between disk accesses. ■

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Flash

From Ashley Watson

THE FOLLOWING 230-byte machine code program gives the Dragon 32 an extra command to flash certain words etc on the screen at a certain speed even while the Dragon is doing something else.

To use the routine type in the BASIC listing — listing one. If the data statements have been entered correctly then the program should be saved on cassette. If the message ERROR IN DATA appears then the data should be rechecked and RUN again.

The machine code is saved on cassette with

CSAVEM "FLASH",32300,32530,32300

EXEC should then be typed to initialise the new command. The new command which is created is PRINTF. Note that there is no space between the PRINT and the F. To use the command see the examples below:

PRINTF@200,"test";

This would flash the word test on the screen at position 200. The PRINTF has the same features as the PRINT command except that it flashes characters on the screen. If you wish to use the normal PRINT command and you wish to print the variable F then there must be a space between the PRINT and the F, for example PRINT F.

Location $7E88 is the flash rate. This is the number of interrupts which will occur between each flash and is a number between 1 and 255. As 50 interrupts occur every second then

POKE &H7E88,25

would give flash every half second. To stop the flashing type

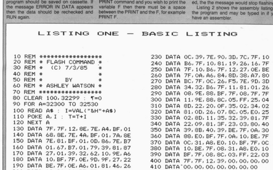
POKE &H7F12,0

as in the following example:

10 PRINTF "press enter to continue";
20 INPUT A$
30 POKE &H7F12,0

This example will cause the message to flash on the screen until ENTER is pressed, the the message would stop flashing.

Listing 2 shows the assembly listing of the program and may be typed in if you have an assembler.



```
LISTING ONE — BASIC LISTING

10 REM ******************
20 REM * FLASH COMMAND *
30 REM *  (C) 7/3/85    *
40 REM *                *
50 REM *      BY        *
60 REM * ASHLEY WATSON *
70 REM ******************
80 CLEAR 100,32299 : ¶=0
90 FOR A=32300 TO 32530
100 READ A$ : I=VAL("&H"+A$)
110 POKE A,I : T=T+I
120 NEXT A
130 DATA 7F,7F,12,8E,7E,A4,BF,01
140 DATA 68,8E,7E,4A,BF,01,7A,8E
150 DATA 7E,81,BF,01,0D,86,7E,B7
160 DATA 01,67,B7,01,79,39,81,87
170 DATA 27,01,39,32,62,10,9E,A6
180 DATA 10,BF,7F,0E,9D,9F,27,22
190 DATA BE,7F,0E,A6,01,81,46,26
200 DATA 19,86,01,B7,7F,12,B7,7F
210 DATA 11,9D,9F,BD,90,3D,BE,7F
220 DATA 08,BF,7F,0A,9E,88,BF,7F
230 DATA 0C,39,7E,90,3D,7C,7F,10
240 DATA B6,7F,10,81,19,26,16,7F
250 DATA 7F,10,B6,7F,12,27,0E,BE
260 DATA 7F,0A,A6,84,8D,38,A7,80
270 DATA BC,7F,0C,26,F5,7E,9D,3D
280 DATA 34,32,B6,7F,11,81,01,26
290 DATA 08,9E,88,BF,7F,08,7F,7F
300 DATA 11,9E,88,8C,05,FF,25,04
310 DATA 8D,22,20,0F,35,02,34,02
320 DATA 81,0D,26,07,8C,05,E0,25
330 DATA 02,8D,11,35,32,39,81,7F
340 DATA 22,09,81,3F,23,03,80,40
350 DATA 39,8B,40,39,BE,7F,0A,30
360 DATA 88,E0,BF,7F,0A,10,BE,7F
370 DATA 0C,31,A8,E0,10,BF,7F,0C
380 DATA 10,BE,7F,08,31,A8,E0,10
390 DATA BF,7F,08,8C,03,FF,22,03
400 DATA 7F,7F,12,39,00,00,00,00
410 DATA 00,00,00,00,00,00,00
420 IF T<>20800 THEN PRINT"ERROR
IN DATA" : STOP
```

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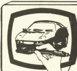

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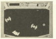

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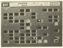

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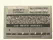

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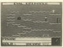

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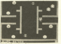

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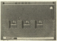

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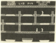

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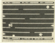

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LISTING TWO — ASSEMBLY LISTING

```
3000 ********************
3000 *  FLASH COMMAND   *
3000 *  FOR DRAGON 32   *
3000 *   WRITTEN BY     *
3000 *  ASHLEY WATSON   *
3000 *     7/3/85       *
3000 ********************
3000                 ORG 32300
7E2C 7F 7F 12        CLR POKE
7E2F 8E 7E A4        LDX£PRINT
7E32 BF 01 68        STX 360
7E35 8E 7E 4A        LDX£GO
7E38 BF 01 7A        STX 378
7E3B 8E 7E 81        LDX£INTERUPT
7E3E BF 01 0D        STX 269
7E41 86 7E           LDA£126
7E43 B7 01 67        STA 359
7E46 B7 01 79        STA 377
7E49 39              RTS
7E4A 81 87          GO CMPA£135
7E4C 27 01           BEQ NEXT
7E4E 39              RTS
7E4F 32 62          NEXT LEAS 2,S
7E51 10 9E A6        LDY $A6
7E54 10 BF 7F 0E      STY DATA
7E58 9D 9F           JSR 159
7E5A 27 22           BEQ EXIT
7E5C BE 7F 0E        LDX DATA
7E5F A6 01           LDA 1,X
7E61 81 46           CMPA£70
7E63 26 19           BNE EXIT
7E65 86 01           LDA£1
7E67 B7 7F 12        STA POKE
7E6A B7 7F 11        STA FLAG
7E6D 9D 9F           JSR 159
7E6F BD 90 3D        JSR 36925
7E72 BE 7F 08        LDX STORE
7E75 BF 7F 0A        STX ADD1
7E78 9E 88           LDX $88
7E7A BF 7F 0C        STX ADD2
7E7D 39              RTS
7E7E 7E 90 3D       EXIT JMP 36925
7E81 7C 7F 10       INTERUPT INC NOINT
7E84 B6 7F 10        LDA NOINT
7E87 81 19           CMPA£25
7E89 26 16           BNE END
7E8B 7F 7F 10        CLR NOINT
7E8E B6 7F 12        LDA POKE
7E91 27 0E           BEQ END
7E93 BE 7F 0A        LDX ADD1
7E96 A6 84          LOOP LDA,X
7E98 8D 38           BSR INVERT
7E9A A7 80           STA,X+
7E9C BC 7F 0C        CMPX ADD2
7E9F 26 F5           BNE LOOP
7EA1 7E 9D 3D       END JMP 40253
7EA4 34 32          PRINT PSHS A,X,Y
7EA6 B6 7F 11        LDA FLAG
7EA9 81 01           CMPA£1
7EAB 26 08           BNE NOFLAG
7EAD 9E 88           LDX $88
7EAF BF 7F 08        STX STORE
7EB2 7F 7F 11        CLR FLAG
7EB5 9E 88          NOFLAG LDX $88
7EB7 8C 05 FF        CMPX£1535
7EBA 25 04           BLO CHECK
7EBC 8D 22           BSR SCROLL
7EBE 20 0F           BRA RETURN
7EC0 35 02          CHECK PULS A
7EC2 34 02           PSHS A
7EC4 81 0D           CMPA£13
7EC6 26 07           BNE RETURN
7EC8 8C 05 E0        CMPX£1504
7ECB 25 02           BLO RETURN
7ECD 8D 11           BSR SCROLL
7ECF 35 32          RETURN PULS A,X,Y
7ED1 39              RTS
7ED2 81 7F          INVERT CMPA£127
7ED4 22 09           BHI BACK
7ED6 81 3F           CMPA£63
7ED8 23 03           BLS NERD
7EDA 80 40           SUBA£64
7EDC 39              RTS
7EDD 8B 40          NERD ADDA£64
7EDF 39             BACK RTS
7EE0 BE 7F 0A       SCROLL LDX ADD1
7EE3 30 88 E0        LEAX -32,X
7EE6 BF 7F 0A        STX ADD1
7EE9 10 BE 7F 0C      LDY ADD2
7EED 31 A8 E0        LEAY -32,Y
7EF0 10 BF 7F 0C      STY ADD2
7EF4 10 BE 7F 08      LDY STORE
7EF8 31 A8 E0        LEAY -32,Y
7EFB 10 BF 7F 08      STY STORE
7EFF 8C 03 FF        CMPX£1023
7F02 22 03           BHI JUMP
7F04 7F 7F 12        CLR POKE
7F07 39             JUMP RTS
7F08 00 00          STORE FDB 0
7F0A 00 00          ADD1 FDB 0
7F0C 00 00          ADD2 FDB 0
7F0E 00 00          DATA FDB 0
7F10 00             NOINT FCB 0
7F11 00             FLAG FCB 0
7F12 00             POKE FCB 0
```

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Discwasher

From Graham Smith of Bristol
This short program is one of several I have stored on my utility disc. I keep this disc write protected with a label over the notch. With this utility you can run through a pack of new discs in a few minutes.

```
10 '******* DISC FORMATTER *******
20 '******* FOR  DRAGONDOS *******
30 '* SAVE ON DISC AND FIT WRITE *
40 '* PROTECT LABEL TO PREVENT   *
50 '* ACCIDENTAL ERASURE         *
60 '******************************
70 '
80 CLS
90 PRINT "THIS UTILITY WILL WIPE THE
DISC"
100 PRINT "CLEAN, SO MAKE SURE YOU
HAVE"
110 PRINT "THE RIGHT DISC INSERTED."
120 PRINT @ 224,"HAVE YOU REMOVED
THE UTILITY    DISC."
130 Y$=INKEY$:IF Y$<>"Y" THEN 130
140 PRINT @ 384,"ARE YOU SURE?";
150 Y$=INKEY$:IF Y$<>"Y" THEN 150
160 PRINT
170 PRINT "O.K. HERE GOES."
180 DSKINIT 1,1,40
190 CLS
200 PRINT "I HOPE YOU HAD THE RIGHT
DISC"
210 PRINT "BECAUSE NOW IT IS CLEAN!!"
220 PRINT
230 PRINT "DO YOU WANT TO DO ANOTHER
ONE";
240 Y$=INKEY$
250 IF Y$="N" THEN END
260 IF Y$="Y" THEN 80
270 GOTO 240
```

Dump

From Steve Gathercole
AS the program is written the screen dump is in single density mode . . . change line 50 to the following for double density mode.

50 PRINT£−2,CHR$ (27) ;CHR$"L";CHR$ (&H0F) ;CHR$ (&HF4) ;

Remember to switch dip switch 2 to 'ON' before running the program. LISTING 1 is the screen dump and LISTING 2 is a short machine code routine which when EXECuted will invert the high res screen. This is useful if you want a 'negative' of the screen. To use the dump first load a game or screen you like, press 'break' (your picture will still be in memory), then type in LISTING 1 and run it. The program will show you the screen as it dumps . . . be warned the program is fairly slow especially in double density, so go off and have a cup of tea!!

To use the screen invert first type in LISTING 2 and run it. The code is now in memory, so just type EXEC 32000 to use the invert.

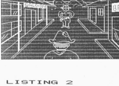
A point to note — due to the printer used a '£' is used in place of the HASH mark (#).

If any readers would like to experiment, line 40 controls the position of the dump on your paper. Line 120 controls the 'Y' depth of the dump. Interesting results are obtained when loading a pmode 3 screen and calling up pmode 4 before dumping the screen. This is because of line 70 which checks to see if a pixel is on or off.

SCREEN DUMP LISTING 1

```
10 REM PUT SWITCH 2 TO ON
20 PMODE 4,1:SCREEN 1,0
30 Y=0
40 PRINT£-2,CHR$(9);CHR$(9);
50 PRINT£-2,CHR$(27);"K";CHR$(&H00
);CHR$(&H01);
60 FOR X=0 TO 255
70 A=PPOINT(X,Y)*128+PPOINT(X,Y+1)
*64+PPOINT(X,Y+2)*32+PPOINT(X,Y+3)
*16+PPOINT(X,Y+4)*8+PPOINT(X,Y+5)*
4+PPOINT(X,Y+6)*2+PPOINT(X,Y+7)*1
80 PRINT£-2,CHR$(A);
90 NEXT X
100 PRINT£-2,CHR$(27);CHR$(48)
110 PRINT£-2,CHR$(10);
120 Y=Y+8:IF Y=>191 THEN END ELSE
GOTO 40
130 PMODE 4,1:SCREEN 1,0:GOTO 130
```

SCREEN DUMP



SCREEN DUMP LISTING 2

```
10 CLEAR100,32000
20 A=31999
30 FOR N=1 TO 14:READ A$
40 POKE A+N,VAL("&H"+A$):NEXT
50 DATA 8E,06,00,A6,80,43,A7,1F,8C
,1E,00,26,F6,39
```

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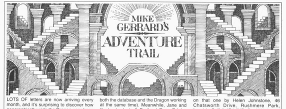

MIKE GERRARD'S ADVENTURE TRAIL

LOTS OF letters are now arriving every month, and it's surprising to discover how geographically wide the Dragon user-base is. Why, only this month I received a letter from The Orion Nebula, which the post-mark suggests is just outside Motherwell. Does the GPO know something Patrick Moore doesn't? Three correspondents from Orion offer advice on *El Diablero*, such as making regular use of the words REMEMBER, DREAM and AWAKE, and they're seeking advice on *Escape From Pulsar 7*. Next time you're near the Nebula, why not call in on the God of Psychedelia and his chums?

Moving slightly nearer home, Lionel Depeux of 5 rue Henri Martin, 92600 Asnieres, France, needs some help on *Return of the Ring*, but has just completed *El Diablero*, so if you want to trade clues write to Lionel, who sends very funny letters. He wonders if anyone is still sane after playing *The Cricklewood Incident*, and his English is so good I think he must have secretly acquired a Babel Fish from some other adventure.

Bob Bernasconi of 16 Woodland View, Lanivet, Bodmin, Cornwall PL30 5HQ asked me how to get rid of "that flipping snake" in *Shenanigans*, and I advised him to try KCORMAHS EHT GNIPPORD (read the clue backwards if you want to know the answer). Bob also wants some general tactical advice on *Ring of Darkness*, so anyone who can shed some light on finding Shedir, get in touch, but do send a stamped addressed envelope if you're writing to anyone whose address I include, especially if you're asking for advice.

That certainly applies if you're writing to Jane and Ken Kennedy, who seem to have completed every known Dragon adventure, and some unknown ones besides. "We consider *El Diablero* and *Knife of Kishtu* the best adventures that we have played so far for the Dragon," they say. I can't share their enthusiasm for the latter, but everyone to their opinions, and they are kindly offering to help anyone out of sticky corners in the likes of the Franklin trilogy, *Keys of the Wizard, Death Mines of Sirus, Circus* and *Waxworks*. No room to list all the titles, but whatever you want help on you can always write to me and if I'm unable to assist you myself I shall refer to my ever-increasing database of clues and addresses (don't tell the editor, but I'm doing it on a Commodore 64, so I can have both the database and the Dragon working at the same time). Meanwhile, Jane and Ken's abode is 6 Portland Row, Edwinstowe, Notts NG21 9JB.

There's rather a sorry letter from Kieran Cleary of Ballyogue, Nine-Mile-House, Carrick-on-Suir, Co Tipperary, Eire, who's finding it very hard to track down Dragon adventures over there in Eire, with shops winding down their stocks. Kieran's also stuck in *Cimeeon Moon*, so if you can help him find some equipment, or maybe would like to swop some adventures if you've finished with them, then Kieran's your man.

A tip from Mark Gadsby of Farnborough on *Death Mines of Sirus*, the arcade-adventure combination from Phoenix. If you can't get through the arcade game to discover the running code for the adventure, then don't type CLOADM but try instead SKIPF "D": CLOAD "D" and then LIST the adventure password, though this does also list clues for the adventure. And a tip too from John Martin of Peterborough. Before you EXEC any machine code adventures, type MOTORON: AUDIOON and adventure away to your favourite music. Yes, play Madness while playing *Madness and the Minotaur*, or Black Sabbath with *Black Sanctum*. Any other suggestions?

I'll have to be brief with the next few letters, or I'll never make it to review the new Scott Adams. Help on *El Diablero* offered by Jules Bowen, 72 Manor Drive North, New Malden, Surrey HT3 5PR, and by Peter Ward, 7 Bakery Way, Landkey, Barnstaple, N. Devon, and help's wanted on that one by Helen Johnstone, 46 Chatsworth Drive, Rushmere Park, Ipswich, Suffolk IP4 5XD. David Hulme of Stafford and Paul Edwards of Manchester both praised Ken Kalish, the author of *El Diablero*, and if you haven't tried it yet then Microdeal are now selling it at only 99p (plus 50p postage), having taken over Dragon Data's stock of the game. A real bargain, that.

More letters next time, but now to Scott Adams and the thirteenth in his series of adventures, *The Sorceror of Claymorgue Castle* at £7.95 from Adventure International. The Dragon version is text-only, and terse text at that. Scott doesn't go in for glowing descriptions, but he does go in for puzzling puzzles . . . and groan-inducing puns. You take the role of a certain Beanwick, an apprentice sorceror, and your task is to retrieve 13 Stars of Power from the Castle, for reasons I've no room to go into here.

"I am in a field," is the first brief description, and you can see a moat, castle and raised drawbridge. No good adventurer should go anywhere without an INVENTORY, and this shows us to be holding six spells, of Fire, Seed, Light Squared, Yoho, Lycanthrope and the Wicked Queen's Spell. One of these will get you into the castle, with a terrible pun, and inside you'll find a courtyard containing a Magic Fountain. Casting caution to the wind I leapt into the fountain and lo and behold, I saw A Star. Treasure number one, I thought, but soon after I was seeing stars, as whatever's in the fountain makes you feel a little odd. I'll get even, I decided, fighting pun with pun and casting my fire spell to frazzle the fountain's contents. No dice, I'm afraid. No star, either.

Off the courtyard is a ballroom containing a chandelier and the tied end of a piece of rope. All right, I'm a sucker for anything. UNTIE ROPE. Ker-ash! One descending chandelier and one deceased adventurer. I bet the chandelier contains another star, too. Scott Adams strikes again, and here's another essential addition to the collection. Adventure International is converting Scott's other titles for the Dragon at the moment, which is marvellous news, but I can see the bottom of the page looming so I'd better stop. After all, we have to get the magazine together and send it all the way to the Orion Nebula, just outside Motherwell, don't we? ■

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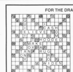

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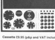

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Dragon Answers

Arrays game

I AM trying to write a program that consists of three different formulas that can be written about 30 different ways. You will find a small subroutine that I have enclosed.

```
 10 CLS
 20 FORA=1TO3
 30 READA$(A)
 40 NEXTA
 50 DATA=SQR(A^2-B^2)
 60 DATAB/A=SIN
   ((B*3.141)/180)
 70 DATA=90-B
 80 FORA=1TO3
 90 PRINTA$(A):NEXTA
100 LIST
```

I am putting them in to an array and then calling them up when the program needs them. This way the program can grow. My problem is how can I get the program to work with a variable that has come from an array? The program is starting with working out trig problems with the smallest amount of information available, ie if A$(1)= " = SQR (A*A−B*B) " and A and B have been defined. then if you say X=A$(1), all that happens is that either X becomes A$(1) or a sn error will be prompted. Am I asking too much of my machine?

J R Griffin
1 Garrard Rd
Britwell Est
Slough
Berks

YOU ARE not asking too much of the Dragon, but to achieve the result you want, you need to use the DEF FN command. Rather than assigning a formula to a string, use the command:

DEF FNA(X)=SQR(A^2−B^2)

When you want to get the result, use R=FNA(0). You can also substitute a value for X in both the DEFine stage and the R=FN stage. The function name can be any normal variable name (up to two characters long).

A Basic problem

I HAVE two questions for you. When I type EXEC 34640 why does a '?' appear below it?

When I type EXEC 33640 why does it say below it IN 65535?

Duncan Chambers
30 Park Avenue
South Shields
Tyne and Wear NE34 8QE

EXEC 34640 is part of the Basic's input routine, the part that prints the '?' character and accepts a line of characters into the buffer. It is of no use from Basic as an SN Error will be generated when you press Enter.

Exec 33640 is a routine which prints IN 'n' where 'n' is the current line number — this is set to 65535 in direct mode. This subroutine is part of the error reporting routine.

It is generally not a good idea to call routines such as these from Basic, as you might end up losing your program!

Lost for words

I HAVE some queries concerning the Dragon 64, and hope that you can help.

a) Why is it that when trying to use SPELLCHECK, I continually get an error message when the program checks the Supplementary dictionary?

b) How do I build a user's Supplementary dictionary?

c) I have configured STYLOGRAPH to suit my printer (a Mannesmann Tally MT80), but why does it occasionally come to a standstill and go off line when printing text? Printer cable is OK.

d) Are there any books covering the use of Dragon Disk Drives?

e) In the Dragon 64 Supplement book (page 6), there is a Keyboard Auto-Repeat Facility. The pokes work, but when I use my disk drive, the disk won't stop revolving! Why?

Only pressing RESET or switching the computer off will stop it. Is there another way of getting this facility on the 64 (in 32K mode)?

G J Tuttiett
32 Heol Calfin
Fforesthall
Swansea
SA5 5EH

TAKING your questions in order:

(A) The problem with the SUPP dictionary supplied with the Stylograph disk is that it is an empty file, and this is what is causing the error with the Spellchecker. To stop the error occurring you must have at least one entry in this file.

(B) The SUPP dictionary is a simple text file stored in the STY directory. You can use Stylograph to create one, there should be one word per line.

(C) I cannot see any reason for this — perhaps your printer is at fault.

(D) I do not know of any books that concentrate on the Dragon disk drives, although there is certainly a need for one, judging by the number of questions regarding these we get.

(E) The auto repeat pokes reset the interrupt routine to the Dragons' Basic ROM. The Disk ROM uses interrupts to control the motor off delay, and this is why the disk motor never stops. If you must use these pokes, you can type POKE &HFF48,0 to stop the disk drive at any time.

Losing memory with Dragon DOS

I HAVE recently purchased a Dragon 64 with Dragon Disk Drive, but I am having difficulty in using the extra 32K memory with Dragon DOS. Typing EXEC merely sets up the standard operating system, not DOS. How can the extra memory be used with DOS?

David Forgan
56 Rectory Road
Farnborough
Hants GU14 7HZ

YOU CANNOT access the full 64K RAM and the cartridge area (where the DOS is stored) at the same time. Therefore, the DOS is not available in 64K mode. It is possible to write a machine code routine which copies the Basic and DOS, from 32768 to 57343 into RAM in 64K mode. This gives you access to an extra 8K from 57344 onwards. This is not accessible from basic, however, only by POKE and in machine code.

Such a transfer program is a simple loop to read from ROM and store in the corresponding RAM location. Writing to location $FFDE puts you in ROM mode, and writing to location $FFDF puts you in RAM mode. It will be necessary to disable interrupts during the copy loop. Such a program is shown below:

```
ORCC        #255     Disable IRQ's
LDX         #32768   Start of Basic
LOOP STA    $FFDE    ROM mode
LDA         ,X       Get byte from ROM
STA         $FFDF    RAM mode
STA         ,X+      Store in RAM
CMPX        #57344   All copied?
BLO         LOOP     No branch again
ANDCC       #255-16  Enable IRQ's
RTS                  Return to Basic in 64K mode
```

The only figures that count

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Competition Corner

Answers to Competition Corner,
Dragon User, 12-13 Little Newport
Street, London WC2H 7PP.

The race is on to win the sprint

***Gordon Lee** sets the problem — Oasis software provide the prizes*

LOOKING BACK over the last two years, I hope that readers will have found something to show that mathematics is not necessarily the dry subject that it is often thought to be, and instead is a rich source of the unusual and the unexpected.

This type of maths — "Recreational" mathematics — is by no means a new phenomenon. Its roots can be traced back over 4,000 years, and yet it is still a science that is bang up to date, with computers playing an important part in some of the recent developments. Nowhere is this more apparent than in the search for prime numbers of increasing magnitude. Beginning in the time of the Greek mathematician Eratosthenes of Cyrene (250 BC) who invented a simple means of listing the smaller prime numbers, numerous mathematicians have since devoted much time and labour to the quest for these enigmatic numbers. Nowadays the search is usually limited to the so-called "Mersenne" primes — that is numbers in the form 2^n-1. These numbers are named after the Frenchman, Father Marin Mersenne (see this page — Dragon User, November 1983) who in his *Cogitata* of 1644 correctly stated that $2^{127}-1$ was prime. How he arrived at this calculation, given the methods then available, is unknown. Curiously, he also stated — although this time incorrectly — that $2^{257}-1$ was also prime. It was not until 1947 that this was shown to be erroneous, since when, with the aid of high speed computers and sophisticated programs, the frontiers of primality have been pushed back even further. On this page in November 1983 the highest prime known was given as the 25,000 digit $2^{86243}-1$. Since then this has now been superceded by the 39,751 digit $2^{132049}-1$, which at the time of writing is now the highest known prime, although, I am sure, the discovery of a yet larger one is not far away.

Consider also Fermat's "last" theorem, so-called because it is the last of his theorems to be proved. This states that the expression $x^n+y^n=z^n$ has no integral (whole number) solutions when n is greater than 2. When n is equal to 2, the equation is, of course, the basis of Pythagoras' theorem with an infinite number of integral solutions. But try to find two cubes that sum to a third cube and the task seems impossible. Computers have checked all integral combinations of cubes up to several millions without a single solution being found. Of course, this does not prove that there is not an as yet untried combination, and so it is necessary to look for an algebraic proof that the problem is impossible. Curiously, there is no such proof available which either proves or disproves Fermat's therorem, and in the three hundred years since Fermat's death mathematicians have sought in vain for this elusive proof.

Fermat's last word

Perhaps the last word should go to Fermat himself. After his death in 1665, in the margin of one of his books was found a scribbled note: "It is impossible to separate a cube into two cubes, . . . or any power except a square into two powers with the same exponent. I have discovered a truly marvellous proof of this, which however, the margin is not large enough to contain".

Could it be that he had indeed found the proof that has since eluded mathematicians for over three centuries? Could it be that this great mathematical mind could have been mistaken? Surely not. Or could it be that, realising the impossibility of such a proof, Fermat pulled what must be the greatest mathematical joke of all time. Perhaps somewhere the ghost of this great man is still having a quiet chuckle at our expense!

And now to this month's competition. Consider, if you will, a number system based not on the usual decimal system but on a base of 26. Thus, the digits could be represented by our normal alphabet: A=1, B=2 and so on up to Y=25. The letter Z would represent zero.

As a consequence of this any word in the English language (or for that matter any random sequence of letters) would have a numeric equivalent. So, for example, the word 'DRAGON' would have a decimal equivalent of 55773784. Now if such a system were in regular use it is quite conceivable that a table of squares would be printed just as there are such tables available in the decimal system.

If I had such a table covering the squares from A to NUT, how many of the squares would form recongnisable English words? ■

Prize

THIS MONTH, Oasis Software has donated 15 copies of *Sprint Basic Compiler* for the Dragon as competition prizes. *Sprint* enables you to convert your Basic programs into intermediate code with ease, speeding up run time by up to five times normal.

Rules

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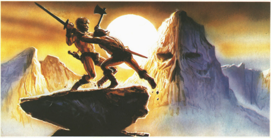

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